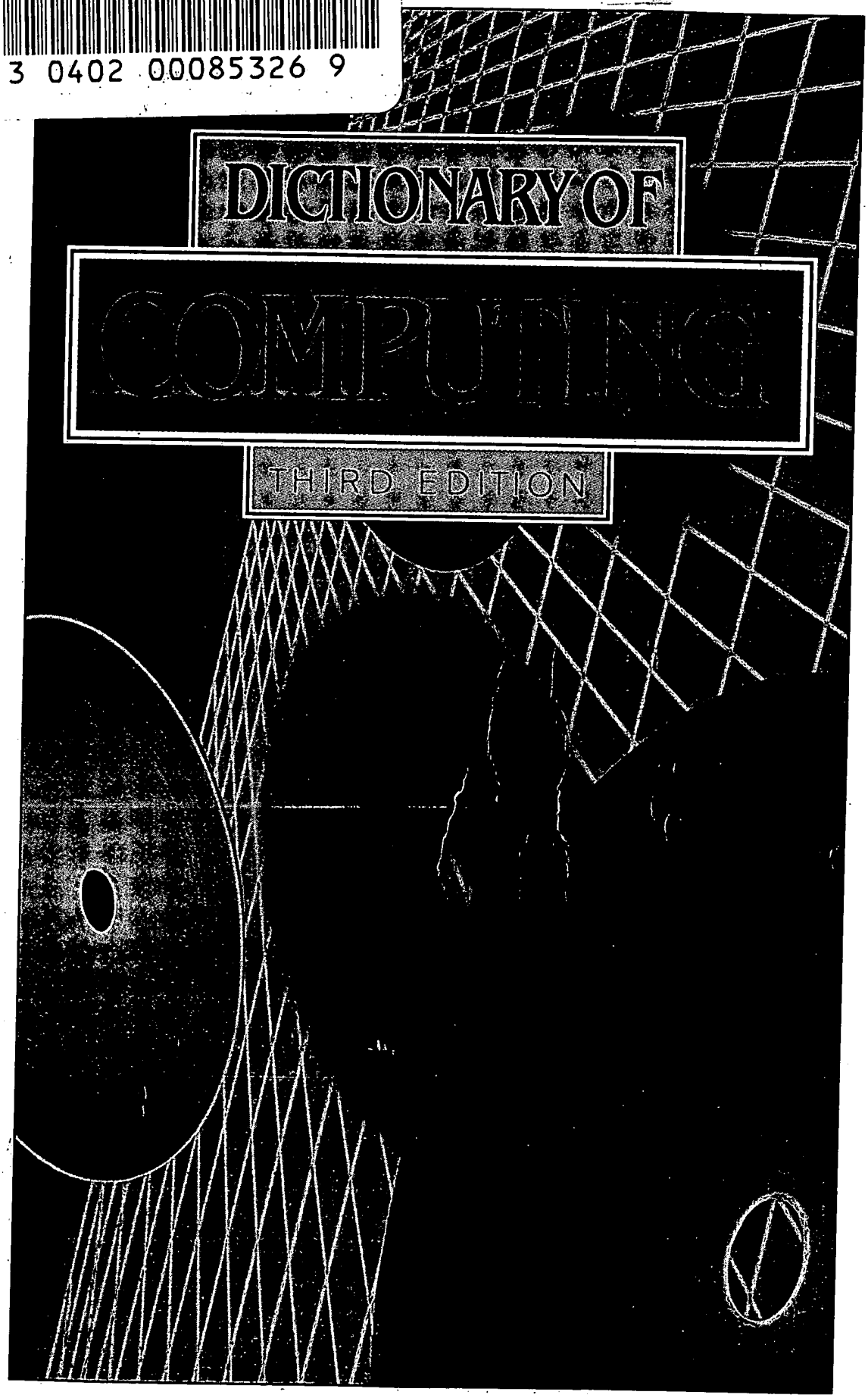
# DICTIONARY OF COMPUTING

THIRD EDITION



*Oxford University Press, Walton Street, Oxford* OX2 6DP
*Oxford New York Toronto*
*Delhi Bombay Calcutta Madras Karachi*
*Kuala Lumpur Singapore Hong Kong Tokyo*
*Nairobi Dar es Salaam Cape Town*
*Melbourne Auckland Madrid*
*and associated companies in*
*Berlin Ibadan*

*Oxford is a trade mark of Oxford University Press*



*First edition 1983*
*Second edition 1986*
*Third edition 1990*
*First issued as an Oxford University Press paperback 1991*



*British Library Cataloguing in Publication Data*
*Data available*

*Library of Congress Cataloging in Publication Data*
*Dictionary of computing.—3rd ed.*
*p. cm.—(Oxford science publications)*
*General editor: Valerie Illingworth.*
*1. Electronic data processing—Dictionaries. 2. Computers—Dictionaries.*
*I. Illingworth, Valerie. II. Series.*
*004'.103—dc20 QA76.15.D526 1900 89-26662*
*ISBN 0-19-286131-X*

5 7 9 10 8 6

*Printed in Great Britain by*
*Biddles Ltd*
*Guildford and King's Lynn*

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lists are found to differ, without having unnecessarily constructed both lists in toto. *See also* strictness.

**LBA** *Abbrev. for* linear-bounded automaton.

**LCA** *Abbrev. for* logic cell array. A form of *PAL in which the programming information is held in a *SIPO *shift register, so that the mode of operation of the device can be read into it when the system of which it is a part is started up. The contents of the register, and therefore the mode of operation of the LCA, remain unchanged while the system is running.

**LCC** *Abbrev. for* leadless chip carrier.

**LCD** *Abbrev. for* liquid-crystal display. A device incorporated into many digital watches, calculators, some small computers, instruments, etc., in order to display numerical, alphabetical, and sometimes other characters. The display comprises groups of segments from which individual characters can be formed. Each segment consists of a normally transparent anisotropic liquid sandwiched between two transparent electrodes. Application of an electric field across the electrodes causes the reflectivity of the liquid to change and the segment becomes opaque. Individual segments can therefore be selectively darkened to form a character. The digits and some letters are typically produced from groups of seven segments. Unlike *LED displays, LCDs do not generate their own light and thus require external illumination; they do however have a lower current drain than other forms of *display.

**LCM** *Abbrev. for* least common multiple.

**LCSAJ** *Abbrev. for* linear code sequence and jump. A section of program code that will always be executed in sequence and followed by a particular sequence. *See also* control flow graph.

**LDU decomposition** *See* LU decomposition.

**leader** A blank section of a tape, preceding recorded information, that is needed for threading the tape into a reading device.

**leadless chip carrier (LCC)** A form of *integrated circuit packaging where connections to the device are not made by means of pins extending beneath the device (as for instance in *DIPs), but instead by means of studs arranged around the package's periphery. This means that the device can be inserted into a socket mounted on a PCB.

**leaf** *Short for* leaf node.

**leaf node (terminal node; tip node; external node)** Any node of a tree with no descendants and hence of *degree zero.

**least common multiple (LCM)** of two integers $m$ and $n$. The smallest integer $p$ such that $m$ divides $p$ exactly and $n$ divides $p$ exactly. For example, the LCM of 9 and 6 is 18.

**least fixed point** *See* fixed-point theorem.

**least significant character** In a *string where the position of a character determines its significance, the character at the end of least significance. Such a string is normally written with the least significant position on the right. For example, the *least significant digit (LSD)* and the *least significant bit (LSB)* contribute the smallest quantity to the value of a digital or binary number.

**least squares, method of** A method of estimating *parameters in a model by minimizing the sum of squares of differences between observed and theoretical values of a variable. If

$$y_i,\ i = 1, \ldots, n,$$

status of the system to be observed from remote locations.

2. *Another name for* supervisor, or even a complete operating system.

3. A programming construct devised by Hoare to allow controlled sharing of resources by otherwise asynchronous processes, and involving the provision of controlled passing of variables between the processes.

**monoid** A *semigroup that possesses an *identity element, $e$. If $S$ is a semigroup on which there is defined a *dyadic operation $\circ$, then

$$x \circ e = e \circ x = x$$

for all elements $x$ in $S$. Monoids play an important role in various areas of computing, especially in the study of *formal languages and *parsing.

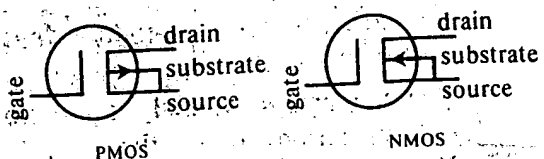
**monomorphism** A *homomorphism that, when viewed as a function, is an *injection.

**monostable (one-shot)** A digital circuit that has only one stable output state. It is constructed in such a way that it may be triggered by an externally generated signal to produce a single pulse. The time duration of the pulse is specified by the choice of external components, usually a capacitor.

**Monte Carlo methods** Numerical methods in which randomly generated numbers play a part in the calculations. A probabilistic model is constructed, corresponding to the mathematical or physical problem, and random samples are taken within the model. By taking more samples, a more accurate estimate of the result is obtained. Such methods are used for example on problems in particle physics, evaluation of multiple integrals, traffic problems, and large-scale operational problems generally. *See also* stochastic process.

**Moore machine** *See* sequential machine.

**morphism** *See* category.




MOSFET circuit symbols

**MOSFET (MOS transistor)** *Acronym for* metal oxide semiconductor field-effect transistor. A type of *field-effect transistor that has an insulating layer of oxide, usually silicon dioxide, separating the gate from the drain-source conduction channel in the semiconductor. In an *NMOS* the channel is formed between n-type source and drain by negative charge carriers (i.e. electrons). In a *PMOS* the channel is formed between p-type source and drain by positive charge carriers (i.e. holes). The circuit symbols are shown in the diagram.

MOSFETs require no gate input current, other than a pulse to charge or discharge their input capacitance. They can operate at higher switching speeds and lower currents than *bipolar transistors. However, *integrated circuits fabricated in MOS technology often operate at slower speeds than their bipolar counterparts because of the space allocated to each transistor.

**MOS integrated circuit** *See* integrated circuit.

**most general common instance** *See* unification.

**MOS transistor** *Another name for* MOSFET.

**most significant character** The character in the most significant position in a number, word, signal, etc. Common examples are the *most significant digit (MSD)* and the *most significant bit*

*(MSB)*, which contribute the greatest quantity to the value of a digital or binary number.

**mother** *Another name for* parent, rarely used.

**mother board** A *printed circuit board into which other boards can be plugged. In some microcomputer systems the mother board carries all the major functional elements, e.g. the processor and some of the memory; the function can be enhanced by additional boards that perform specific activities such as memory extension or disk control and that communicate to the mother board via sockets onto a standard bus. *See also* backplane.

**moth-eye** *See* microrelief.

**Motorola** A US communications firm primarily devoted to automobile and other forms of mobile wireless communications and entertainment radios. Motorola entered the semiconductor field in the late 1950s and is now a major US manufacturer of VLSI design chips. The Motorola 6800 was an also-ran behind the Intel 8080. The Motorola 68000 series of high-performance 16-bit processors is widely used in microcomputers and workstations.

**mouse** A *pointing device that is moved by hand around a flat surface; the movements on the surface are communicated to a computer and cause corresponding movements of the cursor on the display. The mouse has one or more buttons to indicate to the computer that the cursor has reached a desired position. It is normally connected by cable to the computer; a "tail-less" mouse communicates by means of infrared rather than electrical signals.

**movement file** *Another name for* transaction file.

**moving-average methods** *See* time series.

**MPU** *Abbrev. for* microprocessor unit, the primary control and arithmetic element of a microcomputer system. *See* microprocessor.

**MSD, MSB** *Abbrevs. for* most significant digit, most significant bit.

**MS-DOS** An operating system developed by Microsoft Corp. for computers using the Intel 16- and 32-bit family of microprocessors. It provides a set of software services for programs running in a single-user environment and a simple command line interpreter as its user interface. A major facility is a set of services for managing files and I/O devices. It is the system most often run on the IBM PC and similar machines, although its inability to address more than 640 kilobytes of memory means that it will be gradually eclipsed by newer systems such as *OS/2.

**m-sequence** A periodic sequence of symbols generated by a linear *feedback shift register whose feedback coefficients form a primitive *polynomial. A *$q$-ary register (with $q$ prime) whose generating polynomial is of degree $n$ will have period $q^n - 1$, provided that the initial state is nonzero, and its contents will proceed through all the nonzero $q$-ary $n$-tuples. The termwise modulo-$q$ sum of two m-sequences is another m-sequence: the m-sequences (of a given generating polynomial), together with the zero sequence, form a *group.

The term is short for maximum-length sequence. It is so called because the generating shift register only has $q^n$ states, and so such a register (with arbitrary feedback logic) cannot generate a sequence whose period exceeds $q^n$. But with linear logic the zero state must stand in a loop of its own (*see* Good–de Bruijn diagram) and so the period of a linear feedback register cannot exceed $q^n - 1$. This period, which can be achieved when and only when the poly-